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V. *Some select Astronomical Observations made at Chelsea, Latitude  $42^{\circ} 25'$ , and  $26''$  in Time East of the University at Cambridge.* By the Rev. PHILLIPS PAYSON, F. A. A.

THE use of astronomical observations, to promote the purposes of navigation and geography, must be evident to every person that has paid any proper attention to the subject. By comparing observations made in different places; it is well known, special advantages accrue; and by transmitting those of one age down to another, affords astronomers, in future time, great helps for improvement: And no doubt but improvements will be made in this divine science to the end of time.

The extensive territories of the United States of *America*, are a foundation in nature for a vast empire.—The geography of its interior parts, though of great importance; is, at present, but little better than conjectural: To perfect which, and fix the interesting boundaries and lines, the best, and indeed the only proper method is, that of astronomical observations, which, it is probable, the Supreme Council of *America* will soon adopt, now the glorious revolution is so happily compleated. To promote such observations, both at noted head-lands upon the sea-coast, and at distant places in the interior country, highly merits the attention of this Academy: For though they should not at first be made with such accuracy as modern astronomy can boast of, they will prove great helps for future improvements.

The mode of observation, to determine the latitude of a place, is of very easy acquisition: Nor is that difficult which settles its longitude, if a person can be furnished with a good time-piece,

*Hadley's*

*Hadley's* quadrant, and a tolerable telescope. The eclipses of Jupiter's satellites being so frequent, and of such easy observation, they prove very favourable phenomena for this purpose.

But where great accuracy is required, a solar eclipse or an occultation of a star by the dark side of the moon, are to be preferred.

Several places in this and some other states in the union, have been determined in respect to each other, with much precision, from observations of late years. Such as shall be made in future, may correct some errors of the present.

The following observations were made with much care and attention. The clock was an excellent good one, regulated by equal altitudes of the sun taken by reflection with *Hadley's* quadrant : It was counted by a person much used to the thing ; and in all of them, special care was taken in adjusting the equation of equal altitudes for the decrease or increase of the sun's declination.

The glass used, is a reflecting telescope, made by *Nairne*, better than 2 feet in length, and magnifying about 55 times. In a clear air, it shows the satellites of Jupiter to be nearly of the bigness of stars of the first magnitude.

Emerfions of Jupiter's satellites in the year 1779.

1st. Sattelite.		2d. Sattelite.	
	App. Time.		App. Time.
April. 22,	10 <sup>h</sup> 37' 3"	May 29,	8 <sup>h</sup> 58' 00"
May 8,	8 57 19	June 30,	8 39 15
15,	10 52 7	3d. Sattelite.	
June 23,	9 16 40	May 16,	8 54 20
		23,	12 52 40
		June 28,	8 36 1
Observations:			

## Observation of a solar eclipse, June 24, 1778.

	App. Time.
Beginning, A. M.	9 <sup>h</sup> . 6' 42"
Middle,	10 21 55
End exact,	11 38 23

## Observation of a lunar eclipse, May 29, 1779.

Immersion D's S. E. limb,	10 15 44
Ditto D's N. W. limb,	11 31 16
Emersion D's N. E. limb,	12 50 42
Ditto D's S. W. limb,	14 5 55

## Observation of a solar eclipse, October 27, 1780.

Beginning,	11 00 58
Immersion of four spots, nearly in a line, just above the ☉'s center. Spot 1st. Plate II. Fig. I.	11 33 6
2d.	11 34 15
3d.	11 35 6
4th.	11 36 18

## Immersion of a large spot nearly in the ☉'s center.

Beginning,	11 36 18
Spot covered, i. e. end,	11 37 20
Emersion of the four spots above the ☉'s center.	
Spot 1st.	12 53 3
2d.	12 54 23
3d.	12 55 5
4th.	12 56 9

## Emersion of the large spot near the ☉'s center.

Beginning,	12 56 44
Completed,	12 57 45
Eclipse ended,	1 40 37
Duration,	2 39 39

At

At  $11^h 15'$ , mercury in the thermometer stood at  $59^\circ$ .—  
It sank gradually; and at  $12^h 30'$ , stood at  $51^\circ$ .—Then gradually rose to  $59^\circ$ , at  $1^h 15'$ . A little before  $12^h$ , there appeared a large halo, or circle, around the sun, and continued for some time.

Observation of a lunar eclipse, November 11, 1780.

	App. Time.
Beginning,	$10^h 27' 15''$
End,	1 18 50
Duration,	2 51 35

Observation of a solar eclipse, April 12, 1782.

Beginning not observed, the face of the sun being covered with clouds.

Correct app. time of the end of the eclipse, P. M. 2 52 21

Observation of a transit of Mercury over the sun, November 12, 1782.

First ext. contact observed a few seconds too late,	10 7 41
First internal ditto,	10 12 36
Second internal ditto,	11 23 31
Second external ditto,	11 28 58
Duration of the transit,	1 21 17

